



# Iranian adolescents with Scoliosis: Effects of Brace Treatment on Self-esteem, Body Image Concern and Quality of Life

Shahriar Shahidi<sup>1\*</sup> and Narjes Toktam Jannesari<sup>2</sup>

<sup>1</sup>Department of Psychology, Shahid Beheshti University, Evin, Tehran, Iran.

<sup>2</sup>Department of Psychology, Science and Technology Unit, Islamic Azad University, West Azerbaijan, Urmia, Iran.

## Authors' contributions

*This work was carried out in collaboration between both authors. Author SS designed the study, wrote the first draft of the manuscript. Author NTJ designed the study, wrote the protocol, and administered the questionnaires. Both authors managed the literature search as well as analysing the data.*

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## ABSTRACT

**Objective:** The purpose of the present research was to measure quality of life, body image concern and self-esteem in 237 Iranian adolescents aged 12 to 18 years as these variables seem to be very important in patients' psychological well being as well as compliance to treatment.

**Methods:** Participants were divided into those with scoliosis under full time brace treatment; those with scoliosis but not under brace treatment those without scoliosis. Participants completed questionnaires measuring self-esteem, concern for body image and quality of life (QoL).

**Results:** Results showed that adolescents with scoliosis reported lower scores in self-esteem compared to normal adolescents and adolescents who were using brace reported significantly lower QoL and greater body image concern compared to the other groups. In the latter measure, there was no significant difference between normal adolescents and adolescents with scoliosis who were not under brace treatment. Sex differences in scores of self-esteem indicate that girls reported significantly lower self-esteem compared to boys. There were no significant sex

\*Corresponding author: Email: s-shahidi@sbu.ac.ir;

differences in scores of body image concern. As far as QoL was concerned, girls wearing brace reported significantly less satisfaction with life than all the other groups.

**Conclusions:** Results are discussed in terms of the importance of psychological aspects of wearing brace in the prevention and treatment of scoliosis and the need to design intervention programs in order to provide psychological support for adolescents suffering from scoliosis.

*Keywords: Scoliosis; self-esteem; body image; quality of life; Iranian adolescents.*

## 1. INTRODUCTION

Scoliosis is a medical condition in which a person's spine is curved from side to side. Although it is a complex three-dimensional deformity, on an X-ray, viewed from the rear, the spine of an individual with scoliosis can resemble an "S" or a "C", rather than a straight line [1]. Scoliosis is typically classified as either congenital (caused by vertebral anomalies present at birth), idiopathic (cause unknown), or secondary to a primary condition [1]. Recent research has shown that the rate of scoliosis in Iran is comparable to western countries and is increasing rapidly. It is suggested that just over two percent of children in Iran suffer from scoliosis in varying degrees and that girls suffer from this condition five times more than boys [2]. These rates are comparable to those reported in western countries [3].

The traditional medical management of scoliosis is complex and is determined by the severity of the curvature and skeletal maturity, which together help predict the likelihood of progression and ranges from offering special physical exercises to intensive physiotherapy to brace treatment and as a last resort invasive surgery may be necessary to correct the deformity. Bracing is normally done when the patient has bone growth remaining and is, in general, implemented to hold the curve and prevent it from progressing to the point where surgery is recommended. Different kinds of braces are available but the Milwaukee brace is the most common brace prescribed in Iran. In an evaluative study of the effectiveness of brace treatment in Iran, the authors claim that this kind of brace is indeed the most prevalent [4]. Compliance to brace treatment is often problematic because the brace is usually uncomfortable to wear and it is not esthetically attractive. Hence adolescents are socially and psychologically unhappy to use it and may show resistance [5]. Research has shown that brace wear, because of the above factors may have negative effects on some important psychological indicators such as body image,

self-esteem and in general the quality of life of children and adolescents [6].

Body image refers to a person's emotional attitudes, beliefs and perceptions of their own body [7]. It has been argued that the physical changes in the structure of the body caused by scoliosis in general and the physical appearance of the brace in particular, may increase anxiety and concern about body image in adolescents [8]. The individual's reactions to these changes depend on several factors including attitudes within the family and cultural values [9]. After scoliosis is diagnosed and the need to wear the brace established, the adolescent tries to adapt to the new stressful situation. Considering the fact that stress about the success of treatment is in itself anxiety provoking, one can expect complex reactions and feelings about wearing the brace on the part of the young person [10]. It has been found that adolescents who use the brace, report significant worry about their appearance and also express worry about initiating and maintaining relationships with their peers [11]. Also short term non compliance to treatment can be meaningfully predicted by having a more negative body image and a less reflective thinking style but a high level of reflective thinking coupled with negative body image predicts noncompliance in long term brace users [12]. It seems apparent that scoliosis has a considerable effect on the individual's concern and worry about body image. It also follows that a negative image of the body, plays a significant role in compliance on the part of the individual. The latter is particularly important as compliance has been considered a significant requirement for the successful treatment of scoliosis [5].

Self-esteem has been defined as "a general emotional self-evaluation" [13, p. 26]. Self-esteem may be considered both an attitude and a judgment about self which encompasses beliefs and feelings. Research has clearly indicated that self-esteem and its development plays a salient role in the psychological wellbeing of the individual [14]. Nevertheless, it

is surprising that despite the wealth of evidence pointing to the central role played by self-esteem in scoliosis, very little attention has been paid to it in this area of medicine [15]. Both specialists and parents dealing with scoliosis in adolescents have repeatedly pointed out that self-esteem is significantly threatened as a result of scoliosis and brace wear due to changes occurring in physical appearance. These problems may arise because of difficulty of treatment (surgery, brace) as well as possible problems adolescents may face in dealing with relationships with peers and in school and the changing social role [16]. Patients who experience surgery, show significantly more self-esteem and report higher scores on quality of life, compared to non-surgery patients after a period of one year. Non-compliant female scoliosis patients show low expectations about the success of treatment, express worry about the possibility of unsuccessful treatment, do not expect social support from others and reported low self-esteem, whereas males in the same group report higher self-esteem and not only expect more social support from others but also are more optimistic about the success of treatment [12].

In recent years researchers have paid a great deal of attention to health issues related to quality of life (QoL) in children and adolescents and a number of paper and pencil measures of QoL have become available [17]. In one study, [6], researchers asked young patients suffering from scoliosis to prioritize their reasons for seeking treatment. The most important criteria for patients, regardless of whether they were candidates for wearing brace or surgery, was physical appearance and aesthetic reasons followed by increasing quality of life and reducing pain and discomfort. It seems that QoL and self-image are the most important psychological factors which predict compliance in wearing brace. In Italy, [18] found that among 108 teenagers suffering from scoliosis, girls reported significantly less QoL than boys, although overall, brace wear had a detrimental effect on QoL of adolescents. In Greece the experience of brace treatment in 12 children was investigated by content analyzing semi structured interviews [8]. Nearly all children reported having experienced stress, anger, fear and shame. Also children reported that despite the fact that they believed enough information about scoliosis had been provided, they felt that they had received little emotional and psychological support from health professionals.

Most of the support had come from family members, friends and peers. In a study in South Africa it was found that patients suffering from scoliosis who were categorized as "conforming" (i.e. patients who followed treatment instructions) reported significantly higher quality of life than their "non-conforming" counterparts (84 vs. 64.5 percent). "Conforming" children also scored higher on scales measuring wellbeing as well as social, emotional and physical functioning [19]. Most studies have clearly indicate that wearing the brace is usually not the treatment of choice and both parents and patients report that they conform because of fear or because they wish to avoid more drastic measures of treatment such as surgery [20] and that no matter what kind of brace is prescribed, most patients report discomfort and irritability and thus lower quality of life as a result of treatment [21]. In Iran, several studies have indicated adverse psychological effects associated with scoliosis in general [22] reporting increased depression, anxiety and aggressiveness in patients as well as lower quality of life and general psychological functioning in adolescents who had undergone surgery. However, psychological functioning associated with brace wear has not yet been systematically investigated in Iran. The aim of the present study was to compare quality of life (QoL), self-esteem and body image concern in adolescents diagnosed with scoliosis and normal adolescents. Further, to investigate the effects of wearing brace on these psychological indices.

## 2. METHODS

### 2.1 Design

The present study was designed to compare three groups of Iranian adolescents. Hence, Participants were divided into those with scoliosis under full time brace treatment; those with scoliosis but not under brace treatment and normal scoliosis free adolescents.

### 2.2 Participants

Participants in the present study were 251 teenagers (mean age 13.92, SD = 1.45, age range 12 – 18 years). Of these, 165 boys and girls were patients diagnosed with scoliosis in the City of Tehran receiving treatment. 85 adolescents were without scoliosis, studying in two high schools in Tehran. All participants were screened for Body Mass Index (BMI) and chronic and / or serious illnesses such as cancer, body deformities (except scoliosis) and mental

disorders. Ten adolescents whose BMI was below 15 or above 28 were eliminated from the sample [23] as well as those suffering from deformities and / or chronic diseases (N = 4). Hence date provided by a final sample of 237 teenagers (158 scoliosis patents and 79 normal children was analyzed. Of the 158 scoliosis patients, 78 were prescribed with a brace but had not yet begun to wear brace and 80 were those who were wearing the Milwaukee brace full time for a period of at least three months). There were 121 girls and 116 boys in the sample. Table 1 shows statistical details for this sample.

**Table 1. Mean age (and standard deviations) for participants**

Group	Sex	N	Mean (SD)
Scoliosis with brace	Girls	41	13.85 (1.71)
	Boys	39	13.56 (1.41)
Scoliosis no brace	Girls	41	13.07 (0.90)
	Boys	37	14.05 (1.28)
Normal	Girls	39	13.76 (1.15)
	Boys	40	13.92 (0.94)
Total	Girls	121	13.56 (1.25)
	Boys	116	13.84 (1.21)
Grand Total		237	13.69 (1.23)

Scoliosis patients were referred to take part in the study by three physicians specialized in orthopedic surgery as well as referrals from two orthopedic centers in Tehran which specialized in making and fitting braces. All patients were diagnosed by these specialists as suffering from scoliosis and whether or not they needed to wear a brace. Ethical approval was obtained from the Ethics Committee of the Psychology Department of the Islamic Azad University in the City of Urmieh, Iran as the study was conducted as a Master's thesis presented by the second author. Written consent forms were obtained from patients and their parents after the purpose of the study was explained in full. Participants in the schools who did not have scoliosis were given questionnaires only after their parents had completed a consent form and the study was explained to both parents and children in full. Participants without scoliosis were not examined physically but a written statement was included in the questionnaire asking participants if they had visited a specialist for any back problems and if they suffered from scoliosis or if they wore a brace.

### 2.3 Questionnaires

The following questionnaires were completed by all participants:

1. The Rosenberg Self Esteem Scale (RSES) [24] has been used widely in Iran and the Persian version has been shown to be reliable and valid [25]. This is a short, ten item scale which was originally created based on positive and negative general views about "self". The score obtained ranges from -10 to +10 where a negative score is indicative of negative self-esteem. Cronbach's alpha for this questionnaire was reported to be 0.73 [25] and test retest reliability has been reported by different researchers to range between 0.82 to 0.88 ranging from three weeks to two months [26].

2. The Body Image Concern Inventory (BICI) [27]. The questionnaire has been translated into Persian and psychometric properties for the Iranian sample have been reported by [28]. This is a 19 item paper and pencil questionnaire in which the respondent is required to indicate on a five point rating scale his or her concern about aspects of body image. Hence an overall score of 19 indicates minimum or no concern and a score of 95 indicates maximum concern about body image. Very high internal reliability in terms of Cronbach's alpha has been reported in Iranian girls and boys (0.93, 0.95 respectively) and strong correlation between BICI and a questionnaire measuring eating disorders in 300 high school girls has been reported (0.64) indicating acceptable validity [28]. Correlation with fear of negative evaluation and fear of negative evaluation of physical appearance has been reported to be 0.43 and 0.55 respectively [29].

3. Satisfaction with Life Scale (SWLS) [30]. Its Persian version was translated and used in an Iranian population [31]. Respondents are required to indicate on a seven point Likert scale intended to measure psychological wellbeing, how satisfied they are with their lives. Thus scores range from seven to 35. Higher scores are indicative of high QoL. The questionnaire's psychometric properties has been reported in several countries including the US, Germany, Japan, Mexico and China and Cronbach's alphas of 0.90, 0.82, 0.79, 0.60 has been reported [32]. In Iran Cronbach's alpha of 0.83 and test retest reliability of 0.69 after one month has been reported. The researchers also found the QoL scale to be positively correlated with the Persian version of the Oxford Happiness Scale

(0.71) and negatively correlated with the Beck Depression Inventory (-0.60).

Data was analyzed using the 18<sup>th</sup> edition of the Statistical Package for Social Sciences (SPSS 18) software. Descriptive (means, standard deviations) as well as inferential statistics (Analyses of Variance, ANOVA's and post hoc tests, Scheffe) were used.

### 3. RESULTS

Table 2 shows means and standard deviations for scores on RSES for boys and girls.

**Table 2. Means (and standard deviations) for self- esteem scores**

Group	Sex	N	Mean (SD)
Scoliosis with brace	Girls	41	-2.14 (3.29)
	Boys	39	-0.92 (5.02)
Scoliosis no brace	Girls	41	-2.00 (2.36)
	Boys	37	-0.21 (4.44)
Normal	Girls	39	+1.64 (5.10)
	Boys	40	+2.70 (5.35)
Total	Girls	121	-0.88 (5.11)
	Boys	116	+0.55 (4.10)
Grand Total		237	-0.17 (4.61)

As can be seen, overall, girls show lower self-esteem than boys and also adolescents with scoliosis have lower self-esteem than their normal counterparts. Two way analysis of variance (ANOVA) was conducted on the data with sex (boys vs. girls) and group (scoliosis with brace vs. scoliosis without brace vs. no scoliosis) as main factors. It was found that the difference between boys and girls was significant ( $F = 8.46$ ,  $df = 1$ ,  $233$ ,  $p < 0.01$ ) indicating that boys reported significantly higher scores of self-esteem compared to girls. Also a significant  $F$  value was obtained for group ( $F = 17.07$ ,  $df = 2$ ,  $233$ ,  $p < 0.001$ ). Post hoc Scheffe tests were conducted and it was found that the source of the difference was between the two scoliosis groups and normal adolescents. In other words, having scoliosis, regardless of whether or not the individual wore a brace has had a detrimental effect on reports of self-esteem. Adolescents with scoliosis who wore brace reported significantly less self-esteem than normal adolescents. The difference between adolescents who did not wear brace and normal adolescents was also significant, whereas no significant difference in self-esteem was found between adolescents with scoliosis who did not wear brace and those who did. Also no

significant interaction between group and sex was found.

Table 3 shows means and standard deviations for scores on BICI for boys and girls.

**Table 3. Means (and standard deviations) for concern for body image scores**

Group	Sex	N	Mean (SD)
Scoliosis with brace	Girls	41	50.87 (11.03)
	Boys	39	49.51 (13.83)
Scoliosis no brace	Girls	41	39.41 (13.51)
	Boys	37	37.51 (13.43)
Normal	Girls	39	37.02 (9.07)
	Boys	40	41.05 (15.76)
Total	Girls	121	42.52 (12.83)
	Boys	116	42.76 (15.14)
Grand Total		237	42.64 (13.99)

As can be seen, adolescents who wear brace seem to have reported more concern about body image than the other two groups. A two way ANOVA showed that there was no significant difference between boys and girls but a significant difference in group ( $F = 20.59$ ,  $df = 2$ ,  $233$ ,  $p < 0.001$ ) and post hoc Scheffe tests indicated that adolescents with scoliosis wearing brace had reported significantly more concern about their body image than the other groups. There was no difference between adolescents with scoliosis who did not wear brace and normal adolescents indicating that wearing brace and not scoliosis per se is the main cause of concern for body image. There was also no interaction effect between group and sex.

Table 4 shows means and standard deviations for scores on SWLS for boys and girls.

**Table 4. Means (and standard deviations) for satisfaction with life scores**

Group	Sex	N	Mean (SD)
Scoliosis with brace	Girls	41	18.00 (3.17)
	Boys	39	24.05 (6.53)
Scoliosis no brace	Girls	41	24.34 (6.54)
	Boys	37	26.02 (5.28)
Normal	Girls	39	24.02 (5.21)
	Boys	40	22.75 (5.91)
Total	Girls	121	22.09 (5.91)
	Boys	116	24.23 (6.04)
Grand Total		237	23.16 (5.98)

It can be seen from Table 4 that girls with scoliosis who wear brace seem to have reported the lowest scores on QoL. This was in fact

confirmed by a significant interaction between sex and group following a two way ANOVA and post hoc Scheffe tests ( $F = 9.90$ ,  $df = 2$ ,  $233$ ,  $p < 0.001$ ). Overall, girls were significantly more dissatisfied with life than boys ( $F = 8.46$ ,  $df = 1$ ,  $233$ ,  $p < 0.001$ ). It can be concluded that similar to the results for concern with body image, it was found that wearing the brace seems to be the most important factor in reducing QoL as adolescents with scoliosis who wore brace, reported significantly less satisfaction with life than adolescents with scoliosis who did not wear brace and normal adolescents. No significant difference was found between the two latter groups.

#### 4. DISCUSSION

Results of the present study showed that out of the three variables of 'concern for body image', 'satisfaction with life' and 'self-esteem', only the latter was significantly worse in adolescents with scoliosis as compared to adolescents without scoliosis. It seems that scoliosis in itself results in lower self-esteem scores. Hence wearing brace per se does not have a negative effect on self-esteem. Considering the fact that in general self-esteem has not been evaluated systematically in patients with scoliosis, the results of the present study is congruent with other research [15] stating that early adolescence is a period of marked self-esteem reduction. In many cultures, both specialists working with patients and parents of children with scoliosis have expressed their concern that changes in body shape and form as well as difficulties caused by the process of treatment including the threat of surgery and brace, do have dire consequences in terms of lowering self-esteem [16]. The latter authors have reported that successful surgery could have a significant effect on increasing self-esteem as young patients showed a significant increase in self-esteem one year after surgery, whereas their self-esteem prior to surgery was significantly lower than their normal counterparts. In the present study it was also found that overall, girls reported significantly lower scores of self-esteem than boys but since the interaction between group and sex was not significant, it cannot be concluded that wearing brace has had any marked effect on the self-esteem of boys and girls. Results reported by other researchers in the field, seem to confirm this [14,15]. These studies generally suggest that girls tend to report lower self-esteem and fewer expectations from others than boys. It

seems that self-confidence and self-efficacy beliefs seem to be positive and high in elementary school aged girls but these factors decrease significantly as girls begin adolescence [14]. This decrease in self-esteem is also apparent in boys but to a lesser degree.

As far as concern with body image is concerned, the results of the present research showed that there was a significant difference in the scores reported by the three groups but the source of this difference was between adolescents with scoliosis who wore brace and the other two groups. In other words, concern about body image is greater only if the adolescent wears brace. Scoliosis per se does not increase concern about body image. This is congruent with results of studies conducted in Greece, Italy and the US [8, 9] suggesting that following diagnosis when the patient is forced to wear the brace, he / she has to adapt to the new situation which entails facing up to having wear a contraption which is esthetically unpleasant. This adaptation is in itself stressful. Also worries about the outcome of treatment as well as changes in life style may be considered to be an extra load on the patient's shoulders [10]. In another study [11], adolescents using brace admitted they were extremely worried about the shape of their body and their physical appearance and that wearing brace made them anxious about initiating and maintaining relationships with their peers. These researchers found that as these adolescents grew older, their anxiety about their body increased and this was particularly so in girls. In the present study, a significant difference in concern for body image between the two sexes was not found. This result is incongruent with the majority of findings in the literature. For example, [11] found that compared to boys, girls were much more worried about the shape and appearance of their body following the diagnosis of scoliosis. One reason why this pattern was not apparent in the Iranian sample may be found in the social norms and mores practiced in Iran. As an Islamic society, abiding to the "Hijab" or the Islamic dress code is compulsory for women in Iran. This mainly includes wearing a relatively long and loose manteau which covers the torso and upper body. Hence it may be argued that wearing the brace under the manteau may to some extent hide the negative unpleasant effects of the brace and hence result in less feeling of embarrassment and anxiety. This point, however, needs to be investigated in more detail in future studies in Iran and other Islamic societies.

Scores of QoL as measured by the Satisfaction with Life Scale also showed an interesting pattern of results. As in the case of body image, it was found that scoliosis per se does not result in lower quality of life but wearing brace decreases satisfaction with life significantly in adolescents. Research in this field has reiterated the need to concentrate on increasing quality of life as an important aim of treatment for scoliosis and also the importance of addressing quality of life concerns caused by scoliosis in general and wearing brace in particular in adolescents and their parents [6,20]. The present study also showed that quality of life was significantly lower in girls as compared with boys and that girls wearing brace reported significantly more dissatisfaction with their lives than all the other groups. This is similar to other findings [8,18].

It seems that scoliosis has considerable effects on some important psychological factors in adolescents. In particular, wearing brace seems to increase concern about body image and decrease satisfaction with life and scoliosis decreases self-esteem in general. Further, it has been argued by several researchers [3,5,12] that negative affect caused by illness and / or treatment procedures may reduce conformity on the part of the patient.

In the present study patients' mere awareness of scoliosis was enough to reduce self-esteem significantly whereas brace wear was the main reason for these patients to express more concern about body image and less satisfaction with life than patients who did not wear brace and normal adolescents. Considering the fact that the concept of "self" is of paramount importance in self-esteem [33], it may be argued that although scoliosis may not be easily noticed, as far as the appearance of the person is concerned, but the diagnosis of scoliosis may become internalized by the patient as a deformity and regardless of others' evaluation, affect self-esteem. An important point is that although "self" seems to play a central role in self-esteem, "self in the eye of others" may be considered important as far as concern for body image is concerned. It may be argued that scoliosis is not necessarily noticeable by others but brace is easily noticed and continuous feedback from others is given to the wearer. This may be an important factor in increasing worry and concern about the physical appearance of one self.

The effectiveness of various kinds of brace as a preventive method for reducing the worsening of scoliosis has been documented in several studies and research in Iran seems to confirm that wearing the brace is effective as a preventive technique in slowing the rate of deviation of the vertebrae [34,35]. A number of studies have repeatedly indicated that psychological factors may play a decisive role [36,37].

It is important to note that in future studies reliance on questionnaires should be reduced. This can be done by using more qualitative techniques such as interviews. It is now over ten years that research on scoliosis has shifted towards more qualitative data gathering techniques. Researchers in Greece [8,11], China [16] and Canada [20], for example have argued that any progressive deformity in the bone structure of the body (such as scoliosis) may result in very complex psychological and behavioral response on the part of the patient. These responses may be more accurately and objectively measures via clinical observations and more qualitative analysis.

Some studies have indicated that the psychological effects of scoliosis and brace wear should be studied from a developmental perspective. In fact some studies have found that psychological differences among scoliosis patients decrease or increase with time and in accordance with the patients' age. For example, [11] found that feelings of shame towards body shape increased significantly in girls suffering from scoliosis and wearing the brace as their age increased. This resulted in a very negative body image in most girls after only a few months of wearing brace. In another study [37] it was claimed that girls undergoing surgery to correct scoliosis may not report a positive body image even after several years following treatment. It is suggested that future research should pay more attention on developmental viewpoints when investigating psychological factors in scoliosis.

Results of the present investigation reiterated the need for psychological intervention for scoliosis in the Iranian population. Intervention programs in various forms should be designed to motivate patients and their families to adapt better to sometimes difficult treatment regimes and to maintain a higher standard of living despite the pain and discomfort which is often inevitable in the treatment of scoliosis. These intervention may be in the form of psycho-

education programs designed to include “important others” as well as adolescents themselves so that psychological, social and even spiritual support could be provided. The experienced gained by researchers in the present study indicates that regarding the social and cultural context of the Iranian society, the role played by the family is of paramount importance in the wellbeing of young scoliosis sufferers. Many parents expressed their deep concern about their child’s illness but seemed ill informed about the nature of scoliosis and possible treatment procedures. It was apparent that cultural biases and stereotypes play an important role in the formation of misconceptions and thus increased anxiety on the part of adolescents and their parents. Many parents indicated that they were ashamed of their child’s “deformity” and were not prepared to discuss scoliosis with others or to make their child’s problems public. Future research should consider these cultural issues more closely.

One of the major limitations faced by the present study was the problem of having access to patients. This was mainly due to the fact that statistically more girls than boys are diagnosed with scoliosis. In Iran, it has been estimated that the ratio of girls to boys is about 5 to 1 [2]. Moreover, researchers had to seek permission from a variety of scoliosis treatment centers in the city of Tehran as well private specialist clinics. The protocol for approaching patients in these centers and clinics was by no means uniform and in many cases even the administration of questionnaires was allowed under very strict conditions. In some cases, questionnaires were not administered by researchers but by the personnel of the clinics. In these cases full briefing was offered and personnel were given detailed instruction about questionnaire administration. Also not all scoliosis patients were resident in Tehran whereas the control group were all resident in Tehran. It would have been better to include a more uniform sample which was not possible considering limitations in time and resources.

## 5. CONCLUSION

Results of the present study showed that Iranian adolescents with scoliosis report lower scores in self-esteem compared to normal adolescents and adolescents who wear the brace report significantly lower QoL and greater body image concern compared to the others. In the latter measure, there is no significant difference

between normal adolescents and adolescents with scoliosis who were not under brace treatment. Sex differences in scores of self-esteem indicate that girls report significantly lower self-esteem compared to boys. There were no significant sex differences in scores of body image concern. As far as QoL is concerned, girls wearing brace report significantly less satisfaction with life than all the other groups. Results reiterate the importance of psychological aspects of wearing brace in the prevention and treatment of scoliosis and the need to design intervention programs in order to provide psychological support for adolescents suffering from scoliosis.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

## REFERENCES

1. Weinstein SL, Dolan LA, Spratt KF, Peterson KK, Spoonamore MJ, Ponseti IV. Health and function of patients with untreated idiopathic scoliosis: A 50-year natural history study. *J Am Med Ass*, 2003;289(5):559–567.
2. Sokhangoie Y. Corrective Movements (Persian Text), Iranian Ministry of Education Publications; 2000, Tehran.
3. Mirtz TA, Thompson MA, Greene L, Wyatt, LA. Adolescent idiopathic scoliosis: Screening for school, community and clinical health promotion. *Chiropractic and Osteopathy*. 2005;13(2):25-36.
4. Ganjavian MS, Behtash H, Vahid-Tari H, Ameri E, Mobini B, Nojoomi M. Effectiveness of the Milwaukee brace in the treatment of idiopathic scoliosis in 10 – 18 year old patients (Persian Text). *Iran J Bone Sur*. 2006;8(2):85-90.
5. Jannesari NT, Shahidi S, Khademi A, Imani S, Ganjavian MS. Comparing body image and self-esteem among adolescents with scoliosis with and without brace (Persian Text). *Iran Psychol Assoc J Contemporary Psychol*. 2014;9(2). (In Press).
6. Negrini S, Grivas TB, Kotwicki T, Maruyama T, Rigo M, Weiss HR. Why do we treat idiopathic scoliosis? What do we want to obtain and to avoid for our patients? *Scoliosis*. 2006;1(4):1-14.
7. American Psychological Association, Task Force on the Sexualisation of Girls. Report



- of the APA Task Force on the Sexualisation of Girls. Cited 2010. Available: <http://www.apa.org/pi/women/programs/girls/report-full.pdf>
8. Sapountzi D, Psychogiou M, Peterson D, Zafiri L, Lordanpoulou E, Michailidou F, Christodoulou A. The experience of brace treatment in children / adolescents with scoliosis. *Scoliosis*. 2006;1(8):1-8.
  9. Bronheim H, Strain JJ, Biller H. Psychiatric aspects of head and neck surgery: Body image and psychiatric intervention. *Gen Hosp Psych*. 1991;13(4):225-232.
  10. Reichel D, Sanchez J. Developmental psychological aspects of scoliosis treatment. *Ped Rehab*. 2003;6(3):221-225.
  11. Korovessis P, Zacharatos S, Koureas G, Megas P. Comparative multi factorial analysis of the effects of idiopathic scoliosis on the self-perceived health status of adolescents treated with brace. *Europ Brace J*. 2007;110(4):537-546.
  12. Lindeman M, Kaisu B. Cognitive strategies and self-esteem as predictors of brace wear noncompliance in patients with idiopathic scoliosis and kyphosis. *J Ped Orthoped*. 1999;19(4):493-499.
  13. Shamloo, S. *Mental Health (Persian Text)*, Roshd Publications, 1990, Tehran.
  14. Nottleman ED, Inoff G, Cutler GB, Loriaux DL, Chorousos GP. Developmental process in American early adolescence: Relation between adolescent adjustment problems and chronological age. *J Ped*. 1987;110(2):473-480.
  15. Erol RY, Orth U. Self-esteem development from age 14 to 30 years: A longitudinal study. *J Person and Soc Psychol*. 2011;101(3):607-619.
  16. Zhang J, He D, Gao J, Yu X, Sun H. Changes in life satisfaction and self-esteem in adolescents with idiopathic scoliosis with and without surgical intervention. *Spine*. 2010;36(9):741-74.
  17. Fayers M, Machin D. *Quality of Life: Assessment, Analysis and Interpretation*; 2012. John Wiley and Sons, UK.
  18. Aulisa AG, Guzzanti V, Perisano C, Marzetti E, Specelia A, Galli M. Determination of quality of life in adolescents with idiopathic scoliosis subjected to conservative treatment. *Scoliosis*. 2010;5:5-7.
  19. Rivett L, Rothberg A, Stewart A, Berkowitz R. The relationship between quality of life and compliance to a brace protocol in adolescents with idiopathic scoliosis: A comparative study. *BMC Musculoskelet Disord*. 2009;10(5).
  20. Donnelly M, Dolan LA, Grand L, Weinstein SL. Patients and parents perspectives on treatment for adolescent idiopathic scoliosis. *The Iowa Orthoped J*. 2003;24(1):76-83.
  21. Deceuninck J, Bernard JC. Quality of life and brace treated idiopathic scoliosis: A cross sectional study performed on a population of 120 children and adolescents. *Ann Physical and Rehab Med*. 2012;55:93-102.
  22. Moslehi M, Saiiari A, Marashiyan F. Study of the relationship between kyphosis, anxiety, depression and aggression of high school boy students. *Procedia: Soc Behav Sci*. 2011;15:1798-1801.
  23. Simons-Morton DG, Donato K, Loria CM. Obesity research and program at the National Heart, Lung and Blood Institute. *J Am Coll Cardiol*. 2010;55:917-920.
  24. Rosenberg M. *Society and the Adolescent Self Image*. Princeton, NJ; 1965. Princeton University Press.
  25. Alizadeh T. Examining the relationship between self esteem and locus of control with infertility related stress in men and women in the city of Tehran (Persian Text). Master's Thesis in General Psychology; 2003. Shahid Beheshti University, Tehran.
  26. Salsali M, Silverstone PH. Low self-esteem and demographic factors and psychosocial stressors in psychiatric patients. *Ann Gen Hosp Psych*. 2003;3:1-8.
  27. Littleton HL, Axsom DS, Pury CL. Development of the Body Image Concern Inventory. *Beh Res and Ther*. 2005;43(2):229-241.
  28. Mohammadi N, Sajjadinejad M. Evaluation the psychometric properties of Body Image Concern Inventory and testing the correlational model of BMI, body image dissatisfaction and self-esteem in adolescent girls (Persian Text). *J of Psychol Studies*. 2007;3(1):85-101.
  29. Bassaknejad S, Ghaffari M. Relationship between fear of bodily deformity and psychological disorders in Iranian students (Persian Text). *J Beh Sci*. 2007;1(2):179-187.

30. Diener E, Emmons R, Larsen R, Griffin S. The satisfaction with life scale. *J Pers Ass.* 1985;1:71-75.
31. Bayani AA, Mohammad-Koochaki A, Goodarzi H. Validity and reliability of the Satisfaction with Life Scale (Persian Text). *J Iran Psychologists.* 2007;3:259-265.
32. Schimmack U, Radhakrishnan P, Oishi SH, Dzokoto V, Ahadi S. Culture, personality and subjective wellbeing: Integrative process models of life satisfaction. *J Pers Soc Psychol.* 2002;82:582-593.
33. Sugar M. *Female Adolescent Development.* Brunner Mazel; 2002. NY.
34. Behtash H, Ameri E, Ganjavian MS, Kabirian N. Comparing long and short term fusion of spine with and without back instrumentation in treating neonatal scoliosis (Persian Text). *J Med Faculty of Tehran Univ.* 2007;65(8):22-28.
35. Mobini B, Behtash H, Ameri E, Ghandahari H. Innate deformities of the spine and some accompanying abnormalities (Persian Text). *Guilan Univ Med J.* 2007;5(1):23-30.
36. Noonan K, Dolan L, Jacobson W. Long term psychosocial characteristics of patients treated for idiopathic scoliosis. *J Ped Orthoped.* 1997;17(1):712-717.
37. Payne WK, Oglivi JW, Resnick MD, Kane RL. Does scoliosis have a psychological impact and does gender make a difference? *Spine.* 1997;22(3):1380-1384.

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